

Abstract for Connections 2004

Poster presentation

Title

Occurrence of Arsenic Species in Idaho Ground Water

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Abstract

Ground water samples from 120 wells in the Idaho Statewide Ambient Ground Water Quality Monitoring Program (Statewide Program) were analyzed for arsenic species to evaluate geochemical influences, spatial distribution, and lithologic associations. Testing for the two major inorganic arsenic species, arsenite [As(III)] and arsenate [As(V)], and organoarsenic compounds, monomethylarsonate and dimethylarsinate, was conducted on ground water samples from sites previously containing arsenic levels above 8 micrograms per liter ($\mu\text{g/L}$). Water samples collected from wells without previous water quality data, which are located in areas with high arsenic concentrations in ground water, also were tested. Approximately 15 percent of the sites in the Statewide Program contain arsenic above the maximum contaminant level (MCL) of 10 $\mu\text{g/L}$. Maximum arsenic concentrations in water samples from the more than 1,900 Statewide Program sites range from 0.1 $\mu\text{g/L}$ to 950 $\mu\text{g/L}$.

The results of arsenic species testing indicate arsenate [As(V)] is the predominant species in samples at approximately 70% of the sites, while 20% of samples had arsenite [As(III)] as the dominant species, and 10 % of the samples contained equal amounts of each species. No correlation coefficients (R^2) were greater than 0.5 for arsenic and major ions and well depth. However, numerous water chemistry differences are evident between arsenite dominant water samples and arsenate dominant water samples. For example, the median dissolved iron and manganese concentrations in arsenite dominant samples are 30 times and 25 times greater, respectively, than the concentrations in arsenate dominant samples. Other geochemical parameters that differed between arsenite dominant samples and arsenate dominant samples include gross alpha, hardness, dissolved oxygen, nitrate, and zinc.

The organoarsenic compounds were not detected in 60% of the samples. Nine samples contained an organoarsenic concentration greater than 1.0 $\mu\text{g/L}$. In all samples, except for one in Twin Falls County, the organoarsenic concentrations comprised less than 10% of the total arsenic concentration. A sample in Twin Falls County with an arsenic concentration of 0.5 $\mu\text{g/L}$ was found to contain an organoarsenic concentration of 0.6 $\mu\text{g/L}$.

More than 90% of the sites with arsenic over 10 $\mu\text{g/L}$ are located in southwest or south-central Idaho and draw water principally from alluvial or basalt aquifers. Two sites are located in northern Idaho and five sites are located in eastern and southeastern Idaho.